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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/549,698 | 07/14/2006 | Masanori Sakai | 2342-0142PUS1 | 9561 |
| 2292 | 7590 | 11/19/2007 | | |
| BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747 | | | EXAMINER CHEN, KEATH T | |
| | | | ART UNIT 1792 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/549,698 | | SAKAI ET AL. | |
| | Examiner | | Art Unit | |
| | Keath T. Chen | | 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Amendment on abstract filed on 10/18/2007 is accepted.

The claim amendment filed on 10/18/2007, addressing claims 1-10 rejection from the first office action (06/15/2007), is acknowledged and will be addressed below.

Claim interpretation

1. Recitation of claim 5 "film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member" does not add to structural limitation to the parent apparatus claim.

Recitation of claims 6-8 of the use of the cleaning gas and various source gases as gas supplies do not add any further structural limitation to the parent claims.

An apparatus that is capable of use the above cited gas or formation of film inside the gas supply member will meet claim limitations of 5-8. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 and 5-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Hatano (US 5709757, hereafter '757).

'757 teaches all limitations of:

Claim 1: A substrate processing apparatus (Fig. 3) comprising: a processing chamber (inside the reaction tube #212) which accommodates substrates (W) therein, a heating member (#213) which heats said substrates, a controller (#222, MFC is a controller, col. 15, lines 42-43) for supplying a first gas (#208) to the process chamber through a first supply tube (lines near V21) and, alternately (capable of alternate supply gases through valves V21-V25, col. 15, lines 44-50), for supplying a second gas (any of #209a-d) to the process chamber through a second supply tube (any lines near V22-25) independent of the first tube, and a single gas supply member (to the left of wafer boat #214) which supplies said first and second gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases (heater is capable be adjusted to any suitable temperature for decomposition of gas), wherein said first and second supply tubes are connected to said gas supply member at a location (near #220, inside the tube #212, both supply tubes are connected to gas supply member through #220) whose temperature is lower (temperature at the bottom is lower than the top of reaction chamber, and the temperature at the bottom of chamber is adjusted by the setting of the heater) than the decomposition temperature of said first gas or said second gas, and said first and second gases are supplied into said processing chamber through said gas supply member.

Claim 2: said gas supply member is a nozzle having a plurality of gas injection openings (as indicated in Fig. 3, the feed line, left of #214, has many openings).

Claim 3: a reaction tube (#212) which forms said processing chamber and which can accommodate a plurality of stacked substrates therein (stack of W on #214), wherein said nozzle extends from a lower portion to an upper portion of said reaction tube along a direction in which said substrates are stacked.

Claim 5: a film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member (a film is capable of forming inside the gas supply member either by choosing the reaction gases or by setting the temperature).

Claim 6: said controller (#222) supplies a cleaning gas (any of #209a-209d, in addition, this is intended use, as discussed in claim interpretation above) is supplied into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

Claim 7: one of said first gas and said second gas is trimethyl aluminum and the other of said first gas and second gas is ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrates (intended use).

Claim 8: one of said first gas and said second gas is tetrakis (N-ethyl-N-methyl amino) hafnium and the other of said first gas and said second gas is ozone, and a hafnium oxide film or films are formed on a surface or surfaces of said substrates (intended use).

Claim 9: A substrate processing apparatus comprising a hot wall type processing furnace (Fig. 3 has heater #213 heating on the reactor wall) which includes a processing chamber which accommodates substrates therein, a heating member which is disposed outside of said processing chamber (#213 is outside of #212) and which heats said substrates, a controller (#222) for supplying a first gas to the process chamber through a first supply tube (through V21 and tubes nearby) and, alternately, supplying a second gas to the process chamber through a second supply tube (through V22-25 and tubes nearby) independent of the first tube, a single gas supply member which supplies said first and second gases into said processing chamber, and which has a portion disposed inside of said heating member (the chamber #212 is inside the heating member #213), wherein said first and second supply tubes are connected to said gas supply member in a region (near #220, inside the tube #212, both supply tubes are connected to gas supply member through #220) whose temperature is lower (temperature at the bottom is lower than the top of reaction chamber, and the temperature at the bottom of chamber is adjusted by the setting of the heater) than a temperature in said processing chamber in the vicinity of said substrate or substrates, and said first and second gases are supplied into said processing chamber through said gas supply member.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over '757, further in view of Miyazaki et al. (US 5252133, hereafter '133).

'757 teaches some limitations of claim 4:

A substrate processing apparatus having a processing chamber which accommodates substrates therein, and a heating member which heats said substrates (as discussed in claim 1 rejection above), in which at least two gases which react with each other (intended use, the apparatus is capable of supplying two gases reacted with each other, also depends on temperature setting) are alternately supplied into said processing chamber to form a desired film or films (abstract) on a surface or surfaces of said substrates, comprising: two supply tubes (5 tubes near each V21 to V25) through which said two gases respectively flow independently from each other; and a single gas supply member which supplies said gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases, wherein said two supply tubes are connected to said gas supply member at a location whose temperature is

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lower than the decomposition temperature of said at least one gas, and said two gases are supplied into said processing chamber through said gas supply member (as discussed in claim 1 rejection above).

'757 does not teach the limitation of claim 4:

Said two supply tubes and said gas supply member are connected to each other in said processing chamber.

'133 is an analogous art in the field of vertically oriented CVD apparatus, particularly in solving the problem of uniformity of deposition or cleaning (col. 2, lines 62-65, and Fig. 7; for '757, col. 1. lines 47-50). '133 teaches the use of one gas inlet tubes (Fig. 1, #30') with two independent supply tubes (#221 and #222) connected to each other inside the processing chamber (#10) for the purpose of supplying gas with uniform concentration (col. 2, lines 3-6).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '133 with '757. Specifically, by connecting both gas supply tubes and the gas supply member inside the reaction chamber as disclosed in '133 to the apparatus in Fig. 3 of '757 for the purpose of improving the gas uniformity. This combination would have had all limitations of claim 4.

The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

'757 discloses the claimed invention except for connecting both gas supply tubes outside the reaction chamber instead of inside the reaction chamber. It would have

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been an obvious matter of design choice to connect both gas supply tubes inside the reaction chamber, since it has been held that rearranging parts of an invention only involves routine skill in the art. *In re Japikse*, 86 USPQ 70.

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '757, further in view of Raaijmakers et al. (US 20010024387, hereafter '387).

For substantially the same reason as in claim 1 rejection above, '757 teaches an apparatus which has every limitation of the apparatus of in the preamble of claim 10, as discussed above.

'757 does not teach the method of claim 10:

The method comprising the steps of: supplying a first one of said two gases to the single gas supply member through a first one of said two supply tubes for a first period of time to form a film on said substrate or substrates; and after said first period of time, supplying a second one of said two gases to the single gas supply member through a second one of said two supply tubes for a second period of time to form a film on said substrate or substrates.

'387 is an analogous art in the field of CVD ([0012], last sentence, and '757, lines 11-16), particularly to overcome the shortcoming of CVD ([0013], lines 3-5). '387 teaches the method of forming film by supplying a first one of said two gases (metal source gas, Fig. 5) for a first period of time (as indicated in the time axis of Fig. 5) to form a film (see, for example, [0045]) on said substrate or substrates; and after said first period of time, supplying a second one of said two gases (oxygen source gas) for a

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second period of time to form a film on said substrate or substrates, for the benefit of “the resultant metal-containing monolayer is desirably self-terminating, such that any excess constituents of the first chemistry do not further react with the monolayer formed by this process” ([0055], lines 8-11).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '387 with '757, by applying the process taught by '387 in the apparatus provided by '757 to execute the processing sequence. As '757 has only a single gas supply member, both the first gas and the second gas would have been supplied to the single gas supply member, through each individual gas supply tubes (connected to the V21-V25 in Fig. 3 of '757).

The motivation to combine would have been self-terminating monolayer growth, as taught by '387 ([0055], lines 8-11).

Response to Arguments

5. Applicant's amendment overcomes 35 USC 112 second paragraph rejection of claim 2.

6. Applicant's arguments filed on 10/18/2007 have been fully considered but they are not persuasive.

a. In regarding to 35 USC 102(b) rejection of claim 1, see pages 8 and 9, applicant argue that Hatano '757 does not teach “a controller for supplying a first gas to the process chamber through a first supply tube and for supplying a second gas to the process chamber through a second supply tube” because only a single tube (#220) between controller (#222) and the process chamber. There

is no limitations in amended claim 1 that require the first and the second supplying tubes to be between the controller and the process chamber, and therefore, this argument is not persuasive.

b. In regarding to 35 USC 103(a) rejection of claim 4, see pages 9 and 10, applicant argue that the first office action did not follow MPEP 706.02(j) because the office action merely indicates that it would have been obvious to combine the references, and request examiner clarify what specific change to Hatano is being proposed. Further, applicant argues that Harano '757 and Miyazaki '133 are not combinable because '133 is teaching two tubes to mix two different gases in a process chamber while '757 is not teaching separate gases in a process chamber (the last paragraph of page 9 to the top of page 10).

The specific change to Hatano '757 was set forth in the first office action on page 7, lines 8-10. Miyazaki '133 teaches an alternate gas injection arrangement that would have been suitable to provide process gases such as those of '757. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness.

Sinclair & Carroll Co. v. Interchemical Corp., U.S. 327, 65 USPQ 297 (1945).

In the last paragraph of page 9 to the top of page 10, at least the last statement about '757 is not correct. '757 recognizes the mixing of two gases (for example, col. 15, lines 36-42 and col. 9, lines 16-22), '757 further provides a mechanism of mixing two different gases (for example, col. 15, lines 42-51) to supply predetermined process gas mixture.

c. In regarding to 35 USC 103(a) rejection of claim 10, see pages 10 and 11, applicant argue that the first office action prima facie case of obviousness has not been presented and the combination result would still not be the invention of claim 10.

Applicant argue that prima facie case is not establish because "the particular modification to Hatano is not identified" and the phrase "to obtain the invention of claim 10" is impermissible hindsight.

The particular modification to Hatano '757 is clearly laid-out in the first office action, which states what exactly '757 does not teach in the method claim 10 on page 7, lines 15-17, that '387 teaches. To rephrase, '387 demonstrates that alternating deposition (ALD) instead of concurrent deposition (CVD) to obtain better control of the process, and applying the process taught by '387 in the apparatus provided by '757. There is no need of any structural modification to apply the process taught by '387, if that is the confusion by the applicant.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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KC

K.C.


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